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(54) Abstract Title

A dispensing device for a plurality of detergent tablets

(57) A dispensing device for dosing more than one detergent tablet in a washing machine. The device comprises a rigid cage structure 1 in which tablets 5 can be secured separately and prevented from contacting one another. The walls of the cage and the internal walls 12 of the structure have apertures 7,9 to allow water to flow through the cage and around the tablets. The dispensing device has a closure, optionally releasable and/or hinged, which provides access to the interior 4.

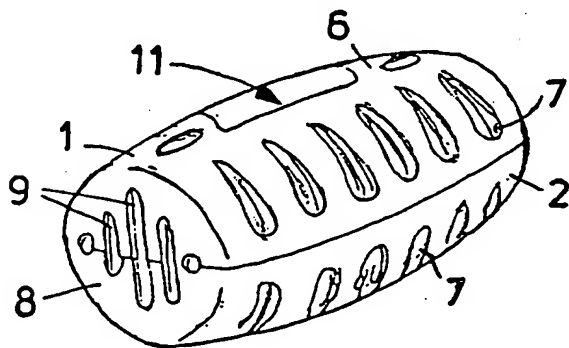


Fig. 4

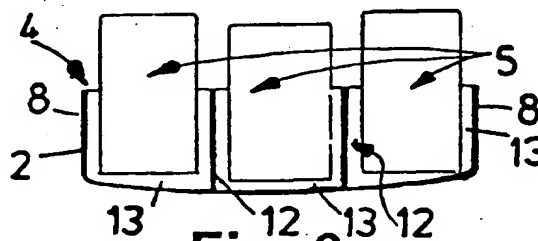


Fig. 6

1-5

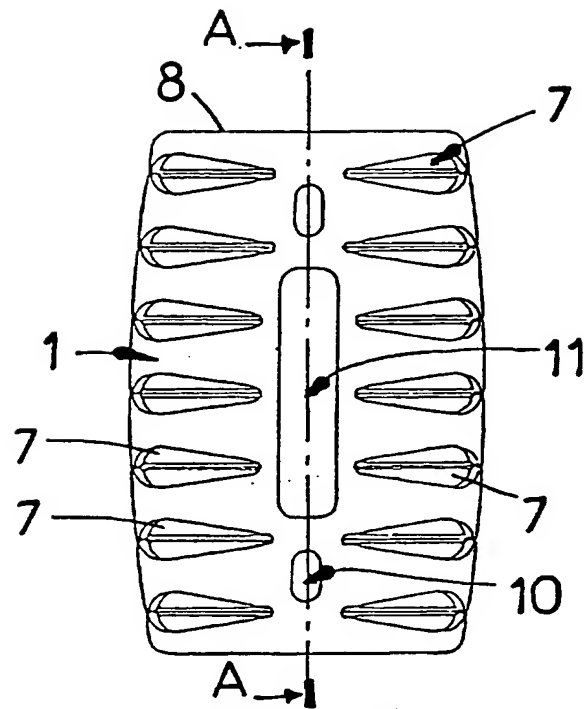


Fig. 1

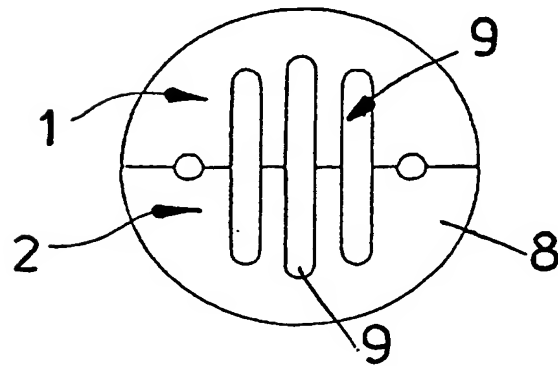


Fig. 2

3-5

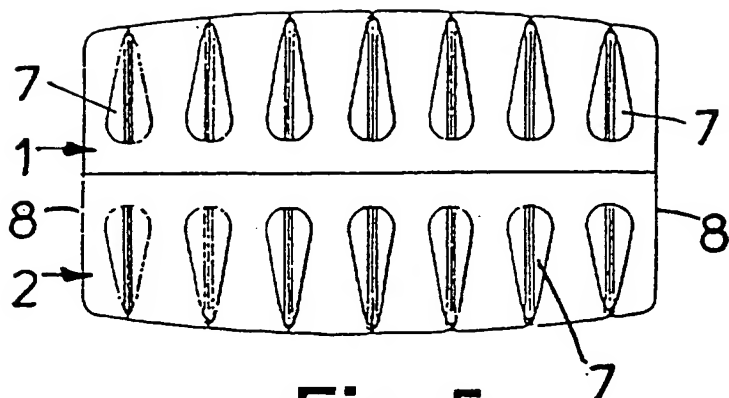


Fig. 5

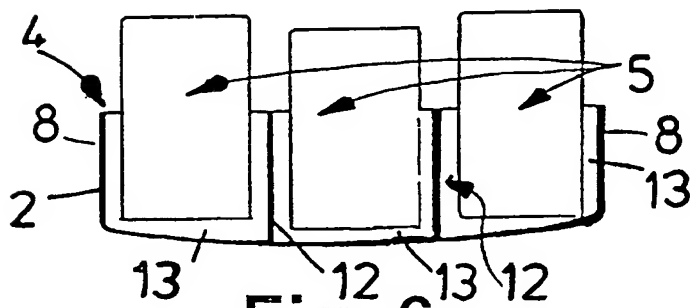


Fig. 6

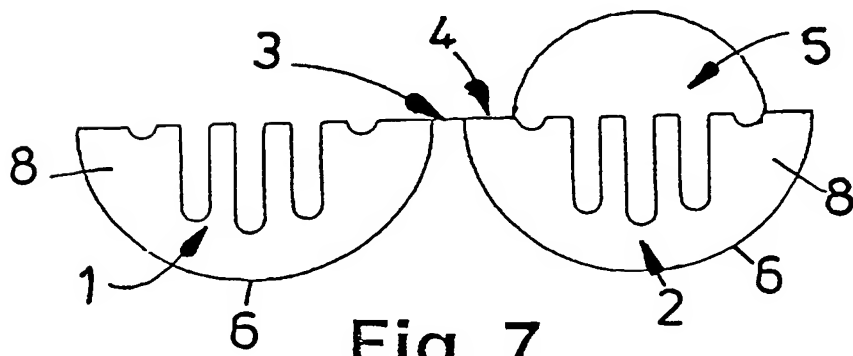


Fig. 7

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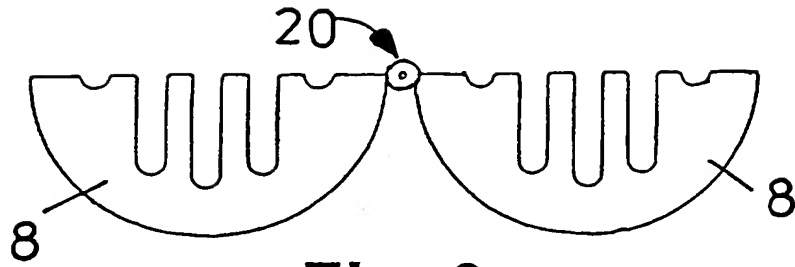


Fig. 8

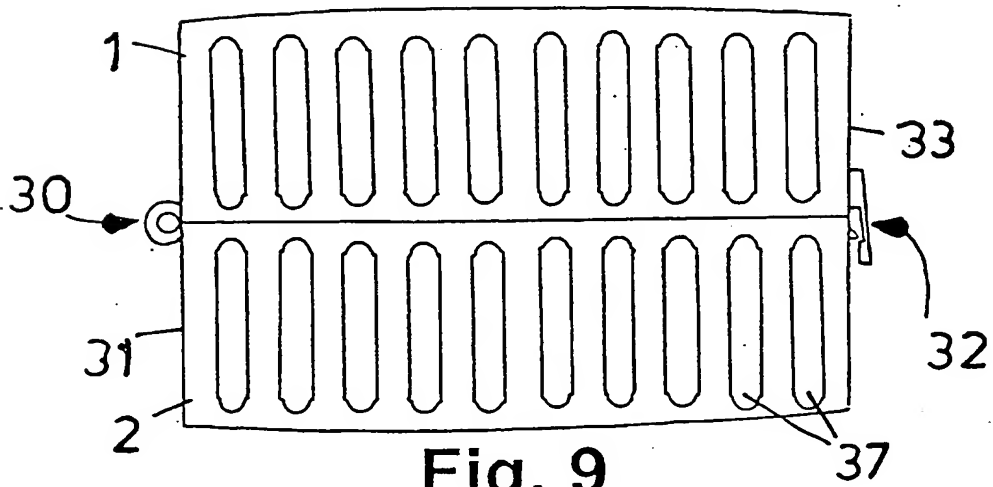


Fig. 9

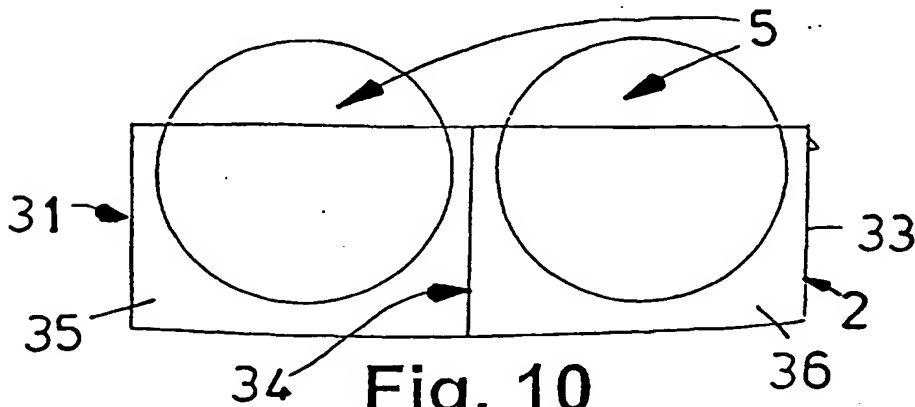


Fig. 10

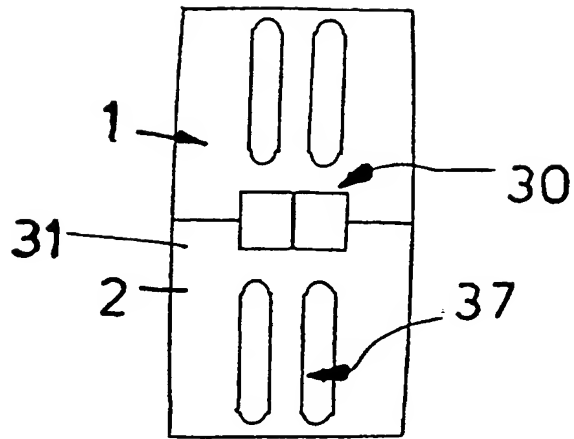


Fig. 11

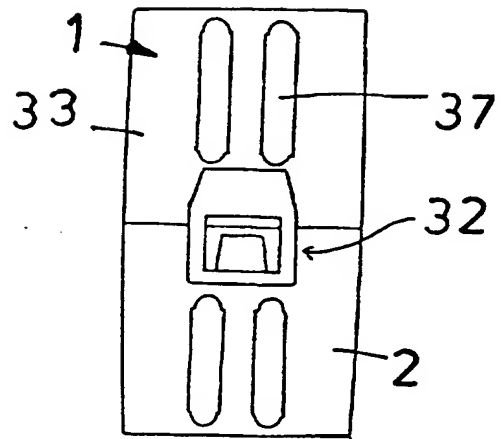


Fig. 12

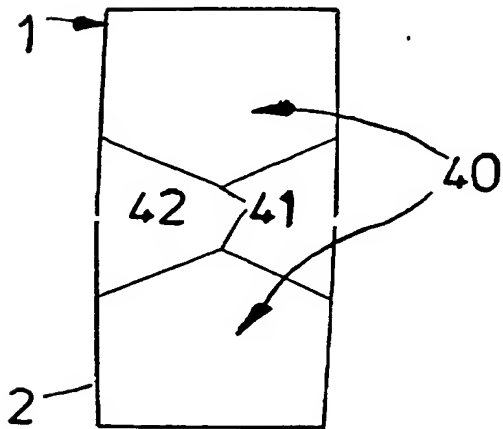


Fig. 13

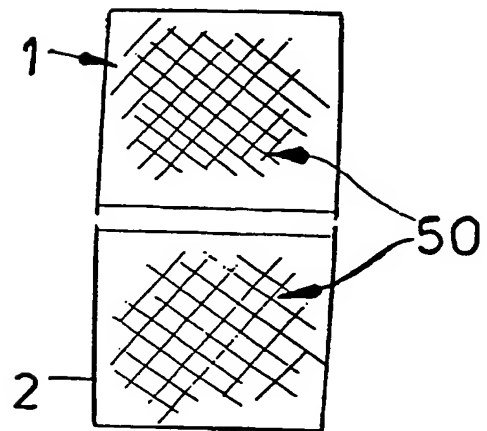


Fig. 14

A DISPENSING DEVICE FOR DETERGENT TABLETS

The present invention relates to a dispensing device for dosing detergent in tablet form such as that used in the washing of laundry in an automatic washing machine or in a dishwasher.

Washing detergent compositions are available in many physical forms. Of these a tablet form provides both convenience and accuracy in detergent dosing. In the following description and claims the term 'tablet' refers to any form of non-particulate solid, for example a block, briquette etc. Such tablets are known in the art and accordingly the present invention relates to tablets of the usual compositions which contain, inter alia, surfactants, water softeners, bleaches and enzymes.

In the interests of convenience it is desirable to limit the number of tablets required per wash whilst not limiting the amount of active detergent. Limiting the dosage to discrete tablets removes the flexibility of adjusting the dosage to account for hard and soft water or heavy and light soiling, for example. In addition the physical amount of detergent used needs to be the same or higher than the equivalent that would be provided in other forms such as, for example, a concentrated powder, owing to the incorporation of tablet dissolution aids. The resulting size of tablets produced is such that, given the diversity of washing machines on the market, it is not possible to ensure that the detergent tablet will fit in the conventional detergent dispensing drawer of all washing machine designs. It is therefore desirable to introduce the detergent tablet directly into the wash area, typically the drum of a front loading washing machine or the rack of an automatic dish washing machine. This has been the practice for some time with concentrated textile washing detergent powders. Such a method of dosing solid detergents brings undissolved detergent into intimate contact with dyes and fabrics and can result in dye and fabric damage. Such damage is generally worse with a tablet composition as this will typically remain longer in an undissolved state. This damage has been reduced in a number of ways including, in particular, various designs of dispensing devices into which a tablet is placed prior to introduction into the washing machine.

In designing a dispensing device for detergent tablets careful consideration must be given to various parameters such as, for example, the accessibility of water to the tablet and the retention of small particles. The importance of such factors is to

some extent dependent on tablet size and in particular its surface area. It has been realised that in instances where more than one tablet is used at once any diminution of the aggregate surface area of the tablets by, for example, tablets being held tightly together in a dispensing device or becoming adhered to one another is particularly disadvantageous. It is therefore desirable to provide a dispensing device in which there is reduced potential for detergent tablets coming into contact with the items to be washed as well as with one another whilst still allowing the free access of water to dissolve the tablets.

A very large number of designs have been registered based upon the 'pepper pot' principle for dosing detergent, GB registered designs 1056695, 1051081, 1051082 (Henkel) 1055525 (Unilever) are examples. These all have a reduced porosity so as to prevent unwarranted escape of fluid or powder and hence are unsuitable for the delivery of tabletised products. Other variations on the design avoid the use of a moving part by forming a funnel opening down which powder or liquid may be poured to fill the device prior to use. This arrangement is obviously unsuitable for a tabletised product. GB registered designs 1051882, 1051881, 1055200 (Henkel), 2001868, 2031367 (Unilever) are examples. These designs are intended for powder and liquids use and none shows any potential for use with a tablet detergent.

A higher surface porosity is achieved by EP 0 343 070 (Procter and Gamble) by providing a net with a fixed opening. It is however, unsuitable for detergent tablets as the opening is screened by a 'propeller' type construction to retard powder loss. Simply removing this construction would result in any tablet introduced simply falling out again.

EP 0 343 069 (Procter and Gamble) describes a net open at one end. The open end is sealed by a screw on cap or by a sprung rim. The first device is complex and has moving parts and hence loses convenience and adds cost. The second device in practice requires the combination of materials of different properties (net with spring opening) along with it making it costly. Both devices deliberately incorporate a closure to seal the open end of the net. EP 0 473 532 (Procter and Gamble) describes another similar device with an internal agitator to aid dissolution. Application GB 9812192.4 (McBride) is an improved arrangement also based upon a net. In these

cases any tablets introduced will be free to come in intimate contact with one another and hence potentially stick together and reduce the surface area of the dissolving unit.

EP 0 576 234 Unilever consists simply of a tube of elasticated netting which encloses the tablet, keeping it in place. This case clearly illustrates the lack of recognition of the benefit of segregating the tablets on dissolution as the device purposefully compresses the tablets together to reduce the surface area when multiple tablets are used.

Similarly EP 0 823 236 (Procter and Gamble) discloses a semi rigid device which is capable of compressing tablets together by virtue of closing two perforated flat sheets of material on either side of a tablet and fastening them at the corners by bending the sheets. This device will also cause tablets to come in close proximity.

EP 0 691 102 (Procter and Gamble) describes a rigid cage with a moving part in the form of a closeable door or latch mechanism. EP 0 699 410 (Procter and Gamble) also describes a latch type mechanism to clamp a detergent tablet in a holder. However, the devices shown are not intended for dosing multiple tablets presumably since single dosage in automatic dish washing is common. Also there is no facility for keeping multiple tablets separate within the device.

It is an object of the present invention to obviate or mitigate the above mentioned disadvantages so as to provide a device suitable for dosing detergent tablets whilst protecting their environment and themselves from direct contact.

According to a first aspect of the present invention there is provided a dispensing device for a plurality of detergent tablets comprising a rigid porous housing, the interior of the housing being divided into separate tablet retaining compartments such that, in use, the tablets are kept separate.

The term "rigid" is intended to include a housing that is flexible but resilient so that it retains or recovers its shape in use.

The housing preferably has a plurality of apertures. The interior of the housing may be divided into separate compartments by walls each of which may have at least one aperture.

According to a second aspect of the present invention there is provided a method for treating fabric in a washing machine comprising the steps of placing the fabric into the washing machine inserting detergent tablets into the dispensing device

defined above placing the filled device into the washing machine and operating the machine.

Specific embodiments of the present invention will now be described, by way of example only, with reference to the accompanying drawings in which:

Figure 1 is a plan view from above a first embodiment of a dispensing device in accordance with the present invention shown in a closed position;

Figure 2 is an end view of the device of figure 1;

Figure 3 is an underneath plan view of the device of figure 1;

Figure 4 is a perspective view of the device of figure 1;

Figure 5 is a side view of the dosing device of figure 1;

Figure 6 is a cross sectional view of a lower part of the device along line A-A of figure 1 shown with detergent tablets in-situ;

Figure 7 is an end view of the device of figure 1 shown in the open position and with detergent tablets;

Figure 8 is an end view of a second embodiment of the present invention shown in an open position without tablets in-situ;

Figure 9 is a side view of a third embodiment of the present invention shown in the closed position;

Figure 10 is a cross sectional view of one half of the device of figure 9 shown with detergents in-situ;

Figure 11 is an end view of the device of figure 9;

Figure 12 is a view of the other end of the device of figure 10;

Figure 13 is an internal end cross section device of a fourth embodiment of the present invention;

Figure 14 is an internal end cross section of a fifth embodiment of the present invention.

Referring now to the drawings, the exemplary dispensing device of figures 1 to 7 comprises a rigid moulded cage structure of generally cylindrical cross-section having upper and lower halves 1, 2 joined by a hinge 3 (shown only in figure 7).

The case is openable about the hinge 3 to provide access to its interior 4 in which detergent tablets 5 are housed in use. Arcuate walls 6 of the upper and lower portions 1, 2 are perforated by a plurality of tear-drop shaped apertures 7 whereas end

walls 8 are perforated by elongate slots 9. Additional apertures 10 appear in the arcuate walls 6 of the upper and lower halves 1, 2 of the cage.

The upper half of the cage 1 also has a rectangular area 11 on which information such as instructions or trade marks may be borne.

Internally, the upper and lower portions 1, 2 are divided by laterally spaced walls 12 that are parallel and of identical or similar configuration to the end walls 8 so as to divide the interior of the cage into three chambers 13. Each of the chambers 13 is designed to house a single detergent tablet 5 as shown in figures 6 and 7.

To reduce complexity and cost the device will preferentially be of a single moulded structure and hence may be made of material suitable for forming a hinge by virtue of its flexible nature when thin. Suitable materials are those which remain rigid up to 95°C, are not brittle and may be accurately moulded. The material may have a limited degree of elasticity. Suitable materials are polypropylene or polyethylene. Other suitable materials are available, for example, nylons, urethanes and polyesters. The device structure may optionally be reinforced with fibres but this is not considered necessary. The apertures in the cage structure are open to allow the free flow of water and are small enough to shield the fabric effectively and to ensure retention of the tablet(s) as it dissolves. A maximum aperture size of 2cm and a minimum of 1mm is therefore preferred. More preferable is a hole size of from 1.5cm to 2mm, more preferably from 1cm to 5mm.

The tablets are retained separately in the device by means of closing the cage. The portions of the cage may be held closed by a hook, latch, interlock or releasable fastener (not shown in figures 1 to 7). Alternatively, the latch may hold the cage irreversibly closed.

To be effective the cage is open and allows a free flow of water or solution through the structure both between the tablets and away from tablets. At least 30% of the area of the outside and between the tablets is open to allow a ready water flow. More preferably this should be greater than 50% and most preferably greater than 75%.

The walls defining the individual chambers may have a single aperture or a plurality of openings. A single opening is preferred to reduce mould complexity. The

external surface of the device should preferably consist of a minimum of two orifices and more preferably more than 20 and most preferably at least 60 such openings.

The detergent tablet may consist of one, two or more layers. To produce tablets containing two or more layers, the formulations for the first and second layers are produced separately and then introduced as separate layers into the die of a tableting press and co-compressed. The chemical component(s) of the tablet may be in one or both layers or may be split across the layers. Detergent tablets suitable for use will typically contain surfactant, water softener and other components typically present, as known in the art.

A pressure of 100 kPa to 1000 MPa will generally be suitable for forming the tablet. There are a number of models of tableting press which are capable of producing dual layer tablets, for instance the "Excelpress" and "Rotapress" models are produced by BWI Manesty of Liverpool. It is also possible to modify a single layer press to produce dual layer tablets, for instance an RS model, also ex Manesty, could be modified in any way.

Alternative embodiments of the present invention are shown in figures 8 to 14. In the following description parts corresponding to the design shown in figures 1 to 7 are indicated by the same reference numerals and are not further described except insofar as they differ from their counterparts in figures 1 to 7.

In the embodiment shown in figure 8 an alternative rotary hinge 20 is used in place of the this web hinge of the design shown in figures 1 to 7.

The dispenser design of figures 9 to 12 differs from that of figures 1 to 7 in that the cage is rectangular in cross-section having a hinge 30 disposed at one end wall 31 and a catch 32 at the other end wall 33. The catch 32 is a mechanism of known configuration and serves to releasably secure the upper and lower halves 1, 2 together in the closed position. An internal wall 34, again parallel to the end walls 31, 33, divides the interior of the cage into two tablet retaining compartments 35, 36. The cage also has alternatively shaped apertures 37 in the upper and lower halves 1, 2 and end walls.

Figures 13 and 14 show alternative internal wall designs for both the upper and lower halves 1, 2 of the cage. In the design of figure 13 the walls 40 have upper edges that are inclined to an apex 41 but are separate so as to leave a clearance 42

when the device is closed. In the design of figure 14 the internal walls 50 are constructed of net or mesh material to allow water to pass therethrough.

EXAMPLES

The invention will be further described with reference to the following non-limiting examples.

Tablet dimensions

The examples were conducted using a cylindrical tablet of dimensions:

Diameter 44 mm

Thickness 20 mm

Bevel on top and bottom edges at 45° of 2 mm width.

Composition of tablet

The composition below was prepared as a granulate of Bulk Density of 0.70 g.cc, using a fluidised bed, before tableting.

Component	Weight %
Coco Imido Propyl Betaine 60% solution. Ex Akzo Nobel	3.0%
Synperonic A7 Nonionic surfactant (ex ICI)	6.4%
Sodium triphosphate L16 Grade (Ex Albright and Wilson Ltd)	32.0%
Minor components (antifoam, CMC etc)	2.0%
Sodium carbonate light grade (ex Brunner Mond Ltd)	7.2%
Sodium Silicate C100 as water glass (ex Crossfield)	3.5%
Sodium Silicate dry powder Csol (ex Crossfield)	4.7%
Sodium Perborate Tetrahydrate (Ex Degussa Ltd)	21%
TAED (Ex Hoechst)	4%
Laundrosil DGA (a fabric softening clay) (ex Sud Chemie Ltd)	20.0%
Loss of water on evaporation	Balance
Total	100%

Tablet compression

The tablets were made at a pressure of 5000 kPa using a tableting press "Rotapress" model RS produced by BWI Manesty of Liverpool.

Comparative example C net dosing device construction

Comparative net dosing devices as GB 9812192.4 were constructed of polypropylene netting of thickness 0.5mm with square holes of 4mm on the diagonal, this material was Part No. 0F100 ex Tenax Plastics of Sheffield.

EXAMPLE 1

A dispensing device containing three 40g tablets was placed in the middle of a sealed pillow case lined with P1 bleach sensitive cloth (available from the Society of Dyers and Colourists). This wash placed in the middle of the drum of a Hotpoint Ultimate 1200 using the 40°C main wash cycle containing 4kg of terry towel ballast load. The machine wash was stopped after 20 minutes into the main wash and the dosing device along with any tablet residue removed. The any residue was dried overnight at 105°C and weighed. The level of bleach damage was also measured as a change in reflectance using the Z scale as measured with a Harrison 50 reflectometer.

Dispenser	Weight of Time remaining after 20 minutes	Reflectance change (Bleach damage)
Comparative example A A net made of Netlon as available from Netlon Ltd. UK of (3cm diameter 15cm long) as described in EP A 0 576 234 (Unilever)	82g	6.1
Comparative example B A 'pepper pot closed device' made after the design shown in registered design 1055525 (Unilever)	103g	0.6
Comparative example C A net of non elastic construction as described in GB 9812192.4 fig1	74g	3.4
Device as shown in figs 5 and 6	8g	1.2
Device as shown in figs 5 and 6 but without internal dividing walls	38g	1.3
Device as shown in figs 9-11 (2 tablets only)	4.9g	0.8
Device a shown in figs 9 to 11 but without internal dividing walls (2 tablets only)	17g	1.1

This shows that under a testing condition the rate of tablet dissolution and hence potential for effective detergency is greater for dispensers of the present invention. In addition there is a lower potential for localised dye damage of sensitive

dye cloths. The design of figure 1 is better for dye damage and the design of figure 4 is better for dissolution.

EXAMPLE 2

The method of example 1 was performed using a fast wash half load programme adjustment on the machine and using 5 kg of ballast. The contents of the device were observed visually at the middle and end of a 30 minute main wash cycle.

Dispenser	Mid wash	End of wash
Comparative example A A net made of Netlon as available from Netlon Ltd. UK of (3cm diameter 15cm long) as described in EP A 0 576 234 (Unilever)	Single detergent lump in device	Very small pieces of detergent trapped in net
Comparative example B A 'pepper pot closed device' made after the design shown in registered design 1055525 (Unilever)	Single detergent lump in device	Single detergent lump in device
Comparative example C A net of non elastic construction as described in GB 9812192.4 fig. 1.	Single detergent lump in device	Device empty
Device as shown in figs. 5 and 6	Separate tablets nearly dissolved	Device empty
Device as shown in figs. 5 and 6 but without internal dividing walls	Single detergent lump in device	Device empty
Device as shown in fig. 9 but with internal dividers as shown by 16 in fig. 13.	Separate tablets nearly dissolved	Device empty
Device as shown in fig. 9 without internal dividing walls	Single detergent lump in device	Very small lump of detergent

It is to be appreciated that numerous modifications to the above described design may be made without departing from the scope of the invention as defined in the appended claims. For example, the interior of the cage may be divided into separate compartments by very low walls or relatively small retaining elements that are sufficient to hold the tablets in spaced locations.

CLAIMS

- 1) A dispensing device for a plurality of detergent tablets comprising a rigid porous housing, the interior of the housing being divided into separate tablet retaining compartments such that, in use, the tablets are kept separate.
- 2) A dispensing device according to claim 1, wherein the housing has a plurality of apertures.
- 3) A dispensing device according to claim 1 or 2, wherein the interior is divided into separate compartments by internal walls.
- 4) A dispensing device according claim 3, wherein the internal walls have at least one aperture.
- 5) A dispensing device according to claim 4, wherein at least one of the internal walls is constructed of net material.
- 6) A dispensing device according to any preceding claim wherein the housing has a closure that is operable to provide access to the interior.
- 7) A dispensing device according to claim 6, wherein the closure may be secured to the rest of the housing by means of a releasable fastener.
- 8) A dispensing device according to claim 6 or 7, wherein the closure is connected to the rest of the housing by means of a hinge.
- 9) A method for treating fabric in a washing machine comprising the steps of placing the fabric into the washing machine inserting detergent tablets into the dispensing device according to any one of claims 1 to 8, placing the filled device into the washing machine and operating the machine.



Application No: GB 9915665.5
Claims searched: 1-9

Examiner: Fiona Warner
Date of search: 18 November 1999

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.Q): A4F; D1A (ADKA, ADKG)

Int Cl (Ed.6): A47L (15/44); D06F (39/02)

Other: Online: EPODOC, WPI, PAJ

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	DE 19516312 A (HENKEL) - figs 7-13	1-4 at least
X	US 5129120 A (PROCTER & GAMBLE) - figs 1 and 2 and column 6, lines 3-10	1

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

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